

Amendments to the claims

This listing replaces all prior versions of the claims.

Listing of the claims

1-7. (Cancelled)

8. (Currently Amended) The method of claim 35, 36, 37, 38, 39, 40, or 41, wherein the first radio network controller comprises a default controller for the first radio node, the method further comprising[[,]]:

routing, by the first radio node, data packets received from a third access terminal that does not have an existing session to the first radio network controller.

9. (Cancelled)

10. (Previously Presented) The method of claim 35 or 36, wherein the first or second radio node receives forward link traffic channel packets from more than one radio network controller.

11. (Previously Presented) The method of claim 35 or 36, wherein the first or second radio node sends reverse link traffic channel packets to more than one radio network controller.

12. (Previously Presented) The method of claim 35 or 36, wherein traffic channel radio resources are managed in the first and second radio nodes and the first or second radio network

controller requests radio resources from the first or second radio node before adding any of its sectors to any traffic channel.

13. (Previously Presented) The method of claim 35 or 36, wherein the first and second radio network controllers reside in different locations and are connected by a metropolitan-area network.

14. (Previously Presented) The method of claim 36, 42 or 43, in which the first session is transferred from the first radio network controller in one subnetwork to another radio network controller in another subnetwork based upon a predetermined criterion.

15. (Previously Presented) The method of claim 14, wherein the session transfer is triggered by the first access terminal upon detection of a subnetwork change.

16. (Previously Presented) The method of claim 14, wherein the session transfer is triggered by a radio network controller.

17. (Currently Amended) The method of claim 35, 36, or 37 further comprising[.]:
at the first radio network controller, selecting a packet data serving node to serve the first access terminal.

18. (Currently Amended) The method of claim 35 further comprising[[],]:
at the first radio network controller, using a mobility manager to maintain a current location information of the first access terminal.
19. (Currently Amended) The method of claim 42, 43, or 44 further comprising[[],]:
using an RNC resource control agent to assign sessions to the first and second radio network controllers.
20. (Previously Presented) The method of claim 19, wherein the RNC resource control agent resides on a separate server.
21. (Currently Amended) The method of 35, 39, or 48, wherein each radio node in the radio access network is associated with a default radio network controller, the method further comprising[[],]:
determining, by an RNC resource control agent, an association between a radio node and its default radio network controller.
22. (Currently Amended) The method of claim 19 further comprising[[],]:
performing, by the RNC resource control agent, load balancing in assigning sessions to radio network controllers.

23. (Currently Amended) The method of claim 19, further comprising[[,]]:
selecting, by the RNC resource control agent, a Previously Presented RNC in network-initiated dormant handoffs.
24. (Previously Presented) The method of claim 19, wherein the RNC resource control agent function is distributed among the radio network controllers and radio nodes, and the radio network controllers and the radio nodes continuously communicate resource information to each other to enable individual network nodes to make session assignment decisions on their own.
25. (Currently Amended) The method of claim 19, further comprising[[,]]:
maintaining, by the RNC resource control agent, session information for all sessions under the RNC resource control agent's control.
26. (Previously Presented) The method of claim 35, 39, or 42, wherein the radio network controllers also include a PDSN function.
27. (Previously Presented) The method of claim 26, wherein the PDSN function includes Simple IP, Mobile IP and AAA client functions.
- 28-34. (Cancelled)

35. (Currently Amended) The method of claim 36 also comprising[[,]]:

establishing a first traffic channel between the first access terminal and the first radio network controller of the network through the first radio node when the first access terminal is in the coverage area of the first radio node,

establishing a second traffic channel between the second access terminal and the second radio network controller of the network through the second radio node when the second access terminal is in the coverage area of the second radio node, and

maintaining the first traffic channel between the first access terminal and the first radio network controller without requiring the first traffic channel to pass through another radio network controller when the first access terminal moves from the coverage area of the first radio node to any portion of the coverage area of the second radio node.

36. (Currently Amended) A method comprising[[,]]:

enabling many-to-many communication among radio network controllers and radio nodes through a packet network,

establishing a first session for a first access terminal on a first radio network controller through a first radio node, wherein the first session is established when the first access terminal is dormant, and

maintaining the first session on the first radio network controller as the first access terminal moves from a coverage area of the first radio node to any portion of a coverage area of a second radio node through which a second access terminal has a second session on a second

radio network controller, wherein the first session is maintained when the first access terminal is dormant;

wherein when the first access terminal is dormant, the first access terminal has the first session established on the first radio network controller and does not have any traffic channel established with any radio network controller; and

wherein when the second access terminal is dormant, the second access terminal has the second session established on the second radio network controller and does not have any traffic channel established with any radio network controller.

37. (Currently Amended) The method of claim 35 further comprising[[],]:

sending an access channel message from the first access terminal to the first radio network controller through the second radio node.

38. (Currently Amended) The method of claim 35 further comprising[[],]:

signaling between the first radio network controller and the second radio network controller.

39. (Currently Amended) The method of claim 35 further comprising[[],]:

routing access channel packets received from the first access terminal at the second radio node to the first radio network controller by determining an Internet protocol address of the first radio network controller.

40. (Currently Amended) The method of claim 39 wherein[[,]] the Internet protocol address is determined using a session identifier.

41. (Currently Amended) The method of claim 40 further comprising[[,]]:
storing in the second radio node information to map a session identifier of the first access terminal to an Internet protocol address of the first radio network controller; and
using the stored information at the second radio node to determine the Internet protocol address of the first radio network controller using a session identifier included in an access channel message received from the first access terminal.

42. (Currently Amended) The method of claim 36 further comprising[[,]]:
establishing, through the first radio node, a third session for a third access terminal on a selected one of either the first radio network controller or a second radio network controller.

43. (Currently Amended) The method of claim 42 further comprising[[,]]:
selecting the selected one of either the first radio network controller or the second radio network controller based at least on a loading of the first and second radio network controllers.

44. (Currently Amended) The method of claim 42 further comprising[[,]]:

selecting the selected one of either the first radio network controller or the second radio network controller based at least on the routing distance between the first radio node and the first and second radio network controllers.

45. (Currently Amended) The method of claim 35 further comprising[.];
employing a chassis-based hardware platform with multiple server cards to implement each of the first and second radio network controllers.

46. (Currently Amended) The method of claim 45 further comprising[.];
routing incoming packets to server cards based on session identifiers using an I/O card.

47. (Currently Amended) The method of claim 46 wherein[,] the session identifiers comprise 1xEV-DO UATI.

48. (Currently Amended) The method of claim 36 further comprising[.];
establishing a first association between the first radio node and the first radio network controller, and
establishing a second association between the first radio node and the second radio network controller.

49. (Cancelled).

50. (Currently Amended) The system of claim 79 also comprising a second radio node, ~~and~~
~~in which~~ wherein:

the first and second radio nodes are each configured to receive data from and transmit data to each of the first and second access terminals when the respective access terminal is located in a coverage area associated with the respective radio node;

the first and second radio network controllers are each configured to receive data from and transmit data to the respective first and second access terminals through the first or second radio nodes; and

the packet network enables many-to-many communication among the first and second radio network controllers and the first and second radio nodes, wherein:

a first traffic channel is established between the first access terminal and the first radio network controller of the network through the first radio node when the first access terminal is in the coverage area of the first radio node,

a second traffic channel is established between the second access terminal and the second radio network controller of the network through the second radio node when the second access terminal is in the coverage area of the second radio node, and

the first traffic channel is maintained between the first access terminal and the first radio network controller without requiring the first traffic channel to pass through another radio network controller when the first access terminal moves from the coverage area of the first radio node to any portion of the coverage area of the second radio node.

51. (Previously Presented) The system of claim 50 wherein the network comprises an Internet protocol network.

52. (Previously Presented) The system of claim 51 wherein the first and second radio network controllers and the first and second radio nodes are associated with a single subnetwork.

53. (Cancelled).

54. (Previously Presented) The method of claim 38 wherein the signaling occurs when the first access terminal moves towards any portion of the coverage area of the second radio node.

55. (Previously Presented) The method of claim 40 wherein the session identifier comprises a 1xEV-DO UATI.

56. (Currently Amended) The method of claim 41 further comprising[[,]]:
encapsulating at least one of the access channel messages in an Internet protocol packet with a destination address equal to the Internet protocol address of the first radio network controller.

57. (Currently Amended) The system of claim 79 further comprising[[,]]:

a second radio node enabled to establish a third session for a third access terminal on a selected one of either the first radio network controller or the second radio network controller.

58. (Currently Amended) The method of claim 42 further comprising[[,]]:

maintaining the third session on the selected one of either the first radio network controller or the second radio network controller as the third access terminal moves from the coverage area of the first radio node.

59. (Currently Amended) The method of claim 48 further comprising[[,]]:

establishing a third association between the second radio node and the first radio network controller, and

establishing a fourth association between the second radio node and the second radio network controller.

60. (Currently Amended) The method of claim 35 wherein[[,]] when the first access terminal is in the coverage area of the first radio node, data packets received at the first radio node on the first traffic channel from the first access terminal are sent to a network address of the first radio network controller over the network.

61. (Currently Amended) The method of claim 35 wherein[[,]] when the first access terminal is in the coverage area of the first radio node, data packets destined for the first access terminal

are sent by the first radio network controller to a network address of the first radio node over the network.

62. (Currently Amended) The method of claim 35 wherein[[,]] when the second access terminal is in any portion of the coverage area of the second radio node, data packets received at the second radio node on the second traffic channel from the second access terminal are sent to a network address of the second radio network controller over the network.

63. (Currently Amended) The method of claim 35 wherein[[,]] when the second access terminal is in any portion of the coverage area of the second radio node, data packets destined for the second access terminal are sent by the second radio network controller to a network address of the second radio node over the network.

64. (Currently Amended) The method of claim 35 wherein[[,]] when the first access terminal is in any portion of the coverage area of the second radio node, data packets received at the second radio node from the first access terminal are sent to the network address of the first radio network controller over the network without traversing the second radio network controller.

65. (Currently Amended) The method of claim 35 wherein[[,]] when the first access terminal is in any portion of the coverage area of the second radio node, data packets destined for the first

access terminal are sent by the first radio network controller to the network address of the second radio node over the network without traversing the second radio network controller.

66. (Previously Presented) The method of claim 36, wherein the first radio node receives paging requests from more than one radio network controller.

67. (Previously Presented) A method comprising:

enabling a radio node to simultaneously serve both a first access terminal and a second access terminal, the first access terminal having a first session established on a first radio network controller and the second access terminal having a second session established on a second radio network controller, the radio node being interconnected with the radio network controllers using a packet network, wherein the radio node is enabled to simultaneously serve both the first access terminal and the second access terminal when the first access terminal is dormant;

wherein when the first access terminal is dormant, the first access terminal has the first session established on the first radio network controller and does not have any traffic channel established with any radio network controller; and

wherein when the second access terminal is dormant, the second access terminal has the second session established on the second radio network controller and does not have any traffic channel established with any radio network controller.

68. (Currently Amended) The method of claim 67 further comprising[[],]:
maintaining the first session on the first radio network controller as the first access
terminal moves from a coverage area of the radio node.
69. (Currently Amended) The method of claim 67 further comprising[[],]:
maintaining the second session on the second radio network controller as the second
access terminal moves from a coverage area of the radio node.
70. (Currently Amended) The method of claim 67 further comprising[[],]:
signaling between the first radio network controller and the second radio network
controller.
71. (Currently Amended) The method of claim 67 further comprising[[],]:
routing access channel packets received from the first and second access terminals by
determining an Internet protocol address of the respective radio network controllers.
72. (Currently Amended) The method of claim 71 wherein[[],] the Internet protocol address
is determined using a session identifier.
73. (Currently Amended) The method of claim 72 further comprising[[],]:

storing in the radio node information to map a session identifier of the first access terminal to an Internet protocol address of the first radio network controller, using the stored information at the radio node to determine the Internet protocol address of the first radio network controller using a session identifier included in an access channel message received from the first access terminal.

74. (Currently Amended) The method of claim 67 further comprising[[],]:
establishing, through the radio node, a third session for a third access terminal on a selected one of either the first radio network controller or the second radio network controller.

75. (Currently Amended) The method of claim 74 further comprising[[],]:
selecting the selected one of either the first radio network controller or the second radio network controller based at least on a loading of the first and second radio network controllers.

76. (Currently Amended) The method of claim 74 further comprising[[],]:
selecting the selected one of either the first radio network controller or the second radio network controller based at least on the routing distance between the first radio node and the first and second radio network controllers.

77. (Currently Amended) The method of claim 72 wherein[[],] the session identifiers comprise 1xEV-DO UATI.

78. (Currently Amended) The method of claim 67 further comprising[[,]]:
establishing a first association between the first radio node and the first radio network controller, and

establishing a second association between the first radio node and the second radio network controller.

79. (Previously Presented) A system comprising:

a first radio network controller;

a second radio network controller; and

a first radio node interconnected with the first and second radio network controllers using a packet network, the first radio node enabled to simultaneously serve both a first access terminal and a second access terminal, the first access terminal having a first session established on a first radio network controller and the second access terminal having a second session established on a second radio network controller, wherein the first radio node is enabled to simultaneously serve both the first access terminal and the second access terminal when the first access terminal is dormant;

wherein when the first access terminal is dormant, the first access terminal has the first session established on the first radio network controller and does not have any traffic channel established with any radio network controller; and

wherein when the second access terminal is dormant, the second access terminal has the second session established on the second radio network controller and does not have any traffic channel established with any radio network controller.

80. (Previously Presented) A method comprising:

in a radio access network, serving traffic channels between at least two access terminals and at least two different radio network controllers through a single radio node without regard to which portion of a coverage area of the radio node each of the at least two access terminals is located, wherein data packets between an access terminal of the at least two access terminals and a radio network controller of the at least two different radio network controllers do not traverse any other radio network controller, the single radio node being interconnected with the at least two radio network controllers using a packet network, and

maintaining a session on the radio network controller of the at least two different radio network controllers when the access terminal of the at least two access terminals moves from any portion of a coverage area of the single radio node to any portion of a coverage area of another radio node, wherein the session is maintained when the access terminal is dormant;

wherein when the access terminal is dormant, the access terminal has the session established on the radio network controller and does not have any traffic channel established with any radio network controller.

81. (Previously Presented) The method of claim 80, wherein the serving comprises:

maintaining a first traffic channel between the access terminal and the radio network controller when the access terminal moves from any portion of the coverage area of the single radio node to any portion of the coverage area of the another radio node.

82. (Cancelled)

83. (Currently Amended) The method of claim 80 further comprising[[,]]:

signaling between the at least two different radio network controllers.

84. (Currently Amended) The method of claim 80 further comprising[[,]]:

routing access channel packets received from the access terminal by determining an Internet protocol address of a serving radio network controller of the at least two different radio network controllers.

85. (Currently Amended) The method of claim 84 wherein[[,]] the Internet protocol address is determined using a session identifier.

86. (Currently Amended) The method of claim 85 further comprising[[,]]:

storing, in the single radio node, information to map the session identifier of the access terminal to the Internet protocol address of the serving radio network controller; and

using the stored information to determine the Internet protocol address of the serving radio network controller using the session identifier included in an access channel message received from the access terminal.

87. (Currently Amended) The method of claim 80 further comprising[[],]:

establishing, through the single radio node, another session for another access terminal of the at least two access terminals on a selected one of the at least two radio network controllers.

88. (Currently Amended) The method of claim 87 further comprising[[],]:

selecting the selected one of the at least two radio network controllers based at least on a loading of the at least two radio network controllers.

89. (Currently Amended) The method of claim 87 further comprising[[],]:

selecting the selected one of the at least two radio network controllers based at least on the routing distance between the radio node and the at least two radio network controllers.

90. (Currently Amended) The method of claim 87 wherein[[],] the session identifiers comprise 1xEV-DO UATI.

91. (Currently Amended) The method of claim 80 further comprising[[],]:

establishing a first association between the radio node and a first radio network controller of the at least two radio network controllers, and

establishing a second association between the radio node and a second radio network controller of the at least two radio network controllers.

92. (Previously Presented) A system comprising:

radio nodes;

radio network controllers; and

a packet network interconnecting the radio nodes and the radio network controllers;

the system enabling serving of traffic channels between at least two access terminals and at least two different radio network controllers through a single radio node without regard to which portion of a coverage area of the radio node each of the at least two access terminals is located, wherein data packets between a first access terminal of the at least two access terminals and a first radio network controller of the radio network controllers do not traverse any other radio network controller,

the system also enabling the first access terminal to maintain a first session on the first radio network controller when the first access terminal moves from any portion of the coverage area of the radio node to any portion of a coverage area of another radio node through which a second access terminal of the at least two access terminals has a second session on a second radio network controller of the radio network controllers, wherein the first access terminal is

enabled to maintain the first session on the first radio network controller when the first access terminal is dormant;

wherein when the first access terminal is dormant, the first access terminal has the first session established on the first radio network controller and does not have any traffic channel established with any radio network controller; and

wherein when the second access terminal is dormant, the second access terminal has the second session established on the second radio network controller and does not have any traffic channel established with any radio network controller.

93. (Previously Presented) A method comprising:

at a radio network controller in communication with a first radio node and a second radio node through a packet network that enables many-to-many communication,

establishing a first traffic channel with a first access terminal through the first radio node when the first access terminal is in a coverage area of the first radio node,

maintaining the first traffic channel with the first access terminal without requiring the first traffic channel to pass through another radio network controller when

(a) the first access terminal moves from a coverage area of the first radio node to any portion of a coverage area of the second radio node, and

(b) a second traffic channel exists between a second access terminal, in any portion of the coverage area of the second radio node, and a second radio network controller; and

establishing a first session for the first access terminal through the first radio node when the first access terminal is in the coverage area of the first radio node, and

maintaining the first session as the first access terminal moves from the coverage area of the first radio node;

wherein the first session is established and the first session is maintained when the access terminal is dormant; and

wherein when the first access terminal is dormant, the first access terminal has the first session established through the first radio node and does not have any traffic channel established with any radio network controller.

94. (Canceled)

95. (Currently Amended) The method of claim 93 further comprising[[,]]:

receiving an access channel message from the first access terminal through the second radio node.

96-98. (Canceled)

99. (Currently Amended) The apparatus of claim 100 also comprising[[,]]:

means for establishing a first traffic channel through the first radio network controller with the first access terminal through the packet network and the first radio node when the first access terminal is in the coverage area of the first radio node, and

means for maintaining the first traffic channel with the first access terminal without requiring the first traffic channel to pass through another radio network controller when

(a) the first access terminal moves from the coverage area of the first radio node to any portion of a coverage area of a second radio node, and

(b) a second traffic channel exists between the second access terminal, in any portion of the coverage area of the second radio node, and the second radio network controller.

100. (Currently Amended) An apparatus comprising[[,]]:

means for establishing a first session with a first radio network controller for a first access terminal through a packet network that enables many-to-many communication and a first radio node when the first access terminal is in a coverage area of the first radio node, wherein the first session is established when the first access terminal is dormant, and

means for maintaining the first session as the first access terminal moves from the coverage area of the first radio node to any portion of a coverage area of a second radio node through which a second access terminal has a second session on a second radio network controller, wherein the first session is maintained when the first access terminal is dormant;

wherein when the first access terminal is dormant, the first access terminal has the first session established on the first radio network controller and does not have any traffic channel established with any radio network controller; and

wherein when the second access terminal is dormant, the second access terminal has the second session established on the second radio network controller and does not have any traffic channel established with any radio network controller.

101. (Currently Amended) The apparatus of claim 100 further comprising[[],];

means for receiving an access channel message from the first access terminal through the second radio node and the packet network.

102. (Previously Presented) The method of claim 67 also comprising:

at the radio node,

routing access channel packets received from a third access terminal to a selected one of either the first radio network controller or the second radio network controller by determining an Internet protocol address of a serving radio network controller associated with the third access terminal.

103. (Previously Presented) The method of claim 102 wherein the Internet protocol address is determined using a session identifier.

104. (Previously Presented) The method of claim 103 wherein the session identifier comprises a 1xEV-DO UATI.

105. (Currently Amended) The method of claim 102 further comprising[[],]:
at the radio node, storing information to map a session identifier of the third access terminal to an Internet protocol address of the serving radio network controller.

106. (Currently Amended) The method of claim 102 further comprising[[],]:
encapsulating at least one of the access channel packets in an Internet protocol packet with a destination address equal to the Internet protocol address of the serving radio network controller.

107. (Currently Amended) The method of claim 102, further comprising[[],]:
selecting the selected one of either the first radio network controller or the second radio network controller as the serving radio network controller based at least on a loading of the first and second radio network controllers.

108. (Previously Presented) The method of claim 107, wherein the selecting is performed when an access channel packet of the access channel packets comprises a 1xEV-DO Random Access Terminal Identifier (RATI).

109. (Currently Amended) The method of claim 102 further comprising[[,]]:

selecting the selected one of either the first radio network controller or the second radio network controller as the serving radio network controller based at least on respective routing distances between the radio node and each of the first and second radio network controllers.

110. (Previously Presented) The method of claim 102 wherein the radio node receives forward link traffic channel packets from more than one radio network controller.

111. (Previously Presented) The method of claim 102 wherein the radio node sends reverse link traffic channel packets to more than one radio network controller.

112. (Previously Presented) The method of claim 102 wherein traffic channel radio resources are managed in the radio node, the radio node supports sectors, and the first or second radio network controller requests radio resources from the radio node before adding any of the radio node's sectors to any traffic channel.

113-120. (Canceled)

121. (Previously Presented) The apparatus of claim 130 further comprising:

means for routing access channel packets received from a third access terminal to a selected one of either the first radio network controller or the second radio network controller,

through a packet network enabling many-to-many communication, by determining an Internet protocol address of a serving radio network controller associated with the third access terminal.

122. (Currently Amended) The apparatus of claim 121 further comprising[[,]]:

means for storing information to map a session identifier of the third access terminal to an Internet protocol address of the serving radio network controller.

123. (Currently Amended) The apparatus of claim 121 further comprising[[,]]:

means for encapsulating at least one of the access channel packets in an Internet protocol packet with a destination address equal to the Internet address of the serving radio network controller.

124. (Currently Amended) The apparatus of claim 121 further comprising[[,]]:

means for selecting the selected one of either the first radio network controller or the second radio network controller as the serving radio network controller based at least on a loading of the first and second radio network controllers.

125. (Currently Amended) The apparatus of claim 121 further comprising[[,]]:

means for selecting the selected one of either the first radio network controller or the second radio network controller as the serving radio network controller based at least on

respective routing distances between the radio node and each of the first and second radio network controllers.

126. (Previously Presented) The apparatus of claim 125 wherein the means for selecting comprises means for selecting the selected one of either the first radio network controller or the second radio network controller as the serving radio network controller in response to an access channel packet of the access channel packets that comprises a 1xEV-DO Random Access Terminal Identifier (RATI).

127. (Previously Presented) The method of claim 15 wherein the subnetwork is a 1xEV-DO subnet.

128. (Previously Presented) The method of claim 26, 35, 39, or 42 wherein a radio network controller is co-located with a radio node.

129. (Canceled)

130. (Previously Presented) An apparatus comprising:

means for enabling a radio node to simultaneously serve both a first access terminal and a second access terminal, the first access terminal having a first session established on a first radio network controller and the second access terminal having a second session established on a

second radio network controller, the radio node being interconnected with the radio network controllers using a packet network, wherein the radio node is enabled to simultaneously serve both the first access terminal and the second access terminal when the first access terminal is dormant;

wherein when the first access terminal is dormant, the first access terminal has the first session established on the first radio network controller and does not have any traffic channel established with any radio network controller; and

wherein when the second access terminal is dormant, the second access terminal has the second session established on the second radio network controller and does not have any traffic channel established with any radio network controller.

131. (Previously Presented) The method of claim 36, wherein establishment of the first session follows powering on of the first access terminal and permits establishment of a first traffic channel between the first access terminal and the first radio network controller of the network when the first access terminal is no longer dormant.

132. (Previously Presented) The method of claim 36, wherein the first traffic channel is established in response to a connection request message sent by the first access terminal.